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Determinants Of Carbon Emission Disclosure: Environmental Performance, Environmental Management System, Institutional Ownership

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Abstract. This study examines the effect of environmental performance, environmental management system, and institutional ownership on carbon emission disclosure in energy sector companies listed on the Indonesia Stock Exchange during 2022–2024. This research uses a quantitative approach and secondary data from annual and sustainability reports, selected through purposive sampling, yielding 48 observations. The analysis method employed is multiple linear regression. The results show that environmental performance, environmental management system, and institutional ownership have a positive and significant effect on carbon emission disclosure. These findings indicate that companies with better environmental performance, structured environmental systems, and higher institutional ownership tend to disclose carbon emissions more extensively. The results support legitimacy and stakeholder theories, where companies increase transparency to meet stakeholder expectations and maintain social legitimacy. However, the model has limited explanatory power, suggesting that other factors may influence carbon emission disclosure.

Keywords: carbon emission disclosure, environmental management system, environmental performance, institutional ownership.

I. Introduction

Climate change has emerged as a critical global concern driven by the increasing concentration of greenhouse gases, including carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The escalation of these emissions contributes significantly to global warming and leads to various environmental problems, such as extreme weather events, prolonged droughts, natural disasters, and ecosystem damage. Several countries are recognized as major contributors to global carbon emissions, including China and Indonesia. In 2023, Indonesia generated approximately 675 million tons of CO_2 emissions, placing the country among the world's largest emitters. This situation highlights the importance of Indonesia's role in climate change mitigation efforts, particularly through improving transparency in corporate carbon emission disclosures, especially within the energy sector, which is known as one of the largest sources of emissions (Tanah Air, 2024).

Indonesia has demonstrated its commitment to reducing greenhouse gas emissions through participation in international initiatives such as the Paris Agreement. This agreement encourages companies to support the target of limiting global temperature increases to 1.5°C by implementing sustainable and transparent business practices (Van Soest, den Elzen, & van Vuuren, 2021). Nevertheless, the practice of carbon emission disclosure in Indonesia remains voluntary, resulting in varying levels of disclosure among companies. This condition reflects a discrepancy between stakeholder expectations for environmental transparency and actual corporate reporting practices. According to legitimacy theory, companies tend to disclose carbon emission information as a strategy to obtain and preserve public legitimacy.

Various factors are believed to affect the extent of carbon emission disclosure. Environmental performance, which can be reflected through PROPER ratings, indicates a company's capability to manage environmental impacts effectively. In addition, the implementation of an Environmental Management System (EMS), such as ISO 14001 certification, demonstrates the company's commitment to structured environmental management practices. Institutional ownership also plays an important role as a monitoring mechanism that may encourage greater transparency in environmental reporting practices.

II. Literature Review

Legitimacy theory explains that companies strive to align their values and operational activities with prevailing norms in society in order to create harmony and gain legitimacy from the public, (Dowling & Pfeffer, 1975). Meanwhile, stakeholder theory emphasizes that companies are responsible not only to shareholders but also to all stakeholders who may affect or be affected by corporate activities (Freeman, 1984).

Environmental performance indicates a company's capability to manage environmental impacts arising from its operational activities while complying with environmental regulations. Based on legitimacy theory, companies with better environmental performance are more likely to disclose environmental information to strengthen their legitimacy in society (Suherman & Kurniawati, 2023).From a stakeholder theory perspective, disclosing carbon emissions also serves to maintain reputation and meet stakeholder

expectations (Putri, Mansur, & Hernando, 2024). Research shows that environmental performance has a positive effect on carbon emission disclosure (Fortuna & Nazir, 2022) , although some studies found insignificant results because disclosure is still voluntary(Almuaromah & Wahyono, 2022)
H_1: Environmental performance has an impact on carbon emission disclosure.

Implementing an ISO 14001-based EMS demonstrates a company's commitment to systematic environmental management (Yanto et al., 2025). Legitimacy and stakeholder theory explain that an EMS encourages transparency to meet social and stakeholder demands (Suherman & Kurniawati, 2023). Empirically, EMS has a positive effect on carbon emission disclosure (Desvita & Rahma, 2025) but this effect may not be significant if it is merely a formality (Ummah & Setiawan, 2021).
H_2: Environmental management system has an impact on carbon emission disclosure

Institutional ownership plays a role in enhancing oversight and promoting corporate transparency. Pressure from institutional investors, in line with legitimacy and stakeholder theories, encourages disclosure of carbon emissions to maintain reputation and trust (Desvita & Rahma, 2025). Some studies show a positive influence (Angelina & Handoko, 2023), but others are not significant because disclosure remains voluntary (Yanto et al., 2025).
H_3: Institutional ownership has an effect on carbon emission disclosure.

III. Research Method

This study uses a quantitative, associative design to examine the influence of environmental management systems and institutional ownership on carbon emission disclosure. The data used are secondary, obtained from the annual and sustainability reports of energy sector companies listed on the Indonesia Stock Exchange (IDX) for the 2021–2024 period. The sample was selected using a purposive sampling technique based on the availability of data relevant to the research variables.

Table 1 Sample Selection Criteria

No.	Sample Selection Criteria	It is not in accordance with	In accordance
1.	Energy sector companies listed on the Indonesia Stock Exchange (IDX) during the research period consecutively in 2021-2024	(19)	72
2.	Energy sector companies that did not publish *annual reports* or *sustainability reports* for 2021-2024	(17)	55
3.	Energy sector companies that are not included in the PROPER category of the Ministry of Environment and Forestry in 2021-2024	(43)	12
Number of Research Periods			4
Number of Sample Companies (Number of Companies x Year of Research)			48

Source: Data processed by researchers (2026

Table 2 Operational Definitions and Measurement of Variables

No	Variables	Definition	Indicator
Dependent Variable			
1.	Carbon Emissions Disclosure (CED)	Disclosure of carbon emissions is a voluntary disclosure by companies through the presentation of information related to activities that produce carbon emissions in annual reports and sustainability reports.(Meiryani et al., 2023).	CED is measured using a disclosure checklist developed (Choi, Lee, & Psaros, 2013)based on guidelines from the Carbon Disclosure Project (CDP), which includes 18 disclosure items. $\text{CED} = \frac{\sum \text{di}}{\text{M}}$

Independent Variables			
1.	Environmental Performance (EP)	Environmental performance reflects the company's ability to manage operational impacts in accordance with regulations and demonstrates a commitment to sustainability through increasing transparent disclosure of environmental information to the public.(Desvita & Rahma, 2025)	Environmental performance measurement in this study uses the PROPER rating published by the Ministry of Environment and Forestry (KLHK). Score 1 : Black Score 2 : Red Score 3 : Blue Score 4 : Green Score 5 : Gold
2.	Environmental Management System (EMS)	Environmental Management System (EMS) is a system that regulates the management of environmental aspects in a company through structure, responsibilities, planning, policies and procedures to control operational impacts and obtain international recognition such as ISO 14001 certification.(Suherman & Kurniawati, 2023).	The measurement of the environmental management system in this study uses a dummy variable referring to (Sam & Song, 2022), where companies with ISO 14001 certification are given a value of 1 and those without are given a value of 0.
3.	Institutional Ownership (IO)	Institutional ownership is the proportion of shares owned by institutions that play a role in supervising and controlling company performance. (selma)	Institutional ownership is measured by comparing the number of shares owned by institutional investors to the total shares outstanding, then expressed as a percentage. (Pirzada, Mustapha, & Wickramasinghe, 2015) $IO = \frac{Jumlah\ saham\ yang\ dimiliki\ oleh\ lembaga}{Jumlah\ saham\ yang\ beredar}$

Source: Data processed by researchers (2026)

IV. Results and Discussion

Results

Table 3 Descriptive Statistical Test

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Standard Deviation
EP	48	2.00	5.00	3.6673	0.89151
EMS	48	0.00	1.00	0.9375	0.24462
IO	48	0.20	0.90	0.6486	0.15353
CED	48	0.28	0.94	0.7095	0.18381
Valid N(listwise)	48				

Source: SPSS 31 Output Results (2026)

Based on the descriptive statistics results, all variables have a total of 48 data. The Environmental Performance (EP) variable averages 3.6673, indicating the company's environmental performance is quite good, although there are still variations. The Environmental Management System (EMS) variable averages 0.9375, indicating that most companies have implemented an EMS. Meanwhile, Institutional Ownership

(IO) averages 0.6486, indicating a fairly high level of institutional ownership. Meanwhile, Carbon Emission Disclosure (CED) averages 0.7095, indicating that the level of disclosure of company carbon emissions is relatively good, although not evenly distributed across the sample.

Table 4 Normality Test Results

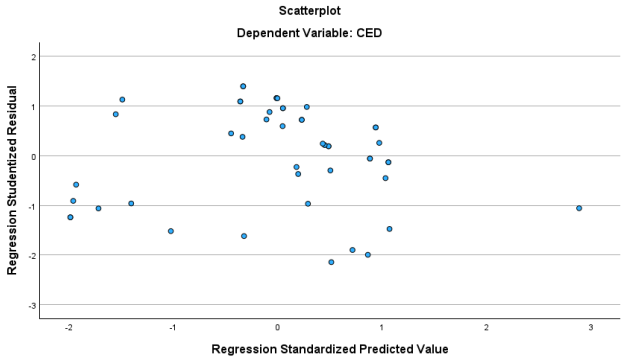
One-Sample Kolmogorov-Smirnov Test

			Unstandardized Residual
N			48
Normal Parameters	Mean		,0000000
	Std. Deviation		,045466838
Most Extreme Differences	Absolute		,118
	Positive		,081
	Negative		-,118
Test Statistic			,118
Asymp. Sig. (2-tailed)[c]			.092
Monte Carlo Sig.(2-tailed)[c]	Sig.		.091
	99% Confidence Interval	Lower Bound	.083
		Upper Bound	.098

Sumber: Hasil Output SPSS 31 (2026)

Based on the test results, the Asymp. Sig. value was 0.092 and the Monte Carlo Sig. value was 0.091, both of which were greater than the 0.05 significance level. Therefore, it can be concluded that the residuals in the regression model are normally distributed, so the normality assumption has been met and the regression model is suitable for use in further testing.

Table 5 Heteroscedasticity Test Results



Source: SPSS 31 Output Results (2026)

The results of the heteroscedasticity test indicate that the points in the scatterplot do not form a pattern and are spread around 0. This shows that the regression model does not exhibit heteroscedasticity, indicating that the homoscedasticity assumption has been met.

Table 6Multicollinearity Test Results

Coefficients[a]

Model		Unstandardized		Coefficients	Collinearity	Statistics
		B		Std. Error	Tolerance	VIF
1	(Constant)	1,253		,0,57		

EP	-0,018	,007	,922	1,084
EMS	-,082	,029	,967	1,035
IO	-,618	,047	,894	1,119

a. Dependent Variable : CED

Source: SPSS 31 Output Results (2026)

Based on Table 6, it is known that the tolerance value of all variables, namely *environmental performance* (EP), *environmental management system* (EMS), *institutional ownership* (IO), and *media exposure* (ME), is > 0.1, and the VIF value of all variables is < 10. Thus, it can be concluded that there are no multicollinearity issues among the independent variables in the regression model.

Table 7Autocorrelation Test Results

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin Watson
1	,331[a]	,110	,047	,14751	,1782

a. Predictors: (Constant), EP, EMS, IO, ME

Dependent Variable: CED

Source: SPSS 31 Output Results (2026)

The autocorrelation test in this study used the Durbin-Watson test. Based on the test results, the Durbin-Watson value was 1.782. With a sample size (n) of 48 and a certain number of independent variables, the upper limit value (du) was 1.6708, so the value of 4 – du = 2.3292. Because the Durbin-Watson value is between the du and (4 – du) values, namely 1.6708 < 1.782 < 2.3292, it can be concluded that there is no autocorrelation in the regression model.

Table 8Multiple Linear Test Results

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	t	Sig
1	(Constant)	,364	,078	4,638	<,001
	EP	,038	,018	2,037	0.048
	EMS	,130	,060	2,186	0.034
	IO	,132	,034	3,837	<,001

a. Dependent Variable: CED

Source: SPSS 31 Output Results (2026)

Referring to Table 7, the multiple linear regression model equation produced in this study is as follows:

$$Y=0.364+0.38EP-+ 0.130EMS+0.132IO+e$$

The interpretation of the regression equation is as follows:

1. The constant value of 0.364 indicates that, if *the environmental performance (EP), environmental management system (EMS), and institutional ownership* (IO) variables are held constant at zero, the carbon emission disclosure (CED) is 0.364.
2. The EP coefficient of 0.038 indicates that every 1 unit increase in EP will increase CED by 0.038, assuming other variables are constant.
3. The EMS coefficient of 0.130 indicates that a 1-unit increase in EMS will increase CED by 0.130, assuming other variables are constant.
4. The IO coefficient of 0.132 indicates that every 1 unit increase in IO will increase CED by 0.132, assuming other variables are constant.

Table 9Results of the Determination Coefficient Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin Watson
1	,331[a]	,110	,047	,14751	,1782

a. Predictors: (Constant), EP, EMS, IO, ME

Dependent Variable: CED

Source: SPSS 31 Output Results (2026)

Based on the Model Summary table, the R-squared value is 0.110. This indicates that the independent variables, namely EP, EMS, and IO, explain 11% of the dependent variable CED, while the remaining 89% is explained by other variables outside the research model. The Adjusted R Square value of 0.047 indicates that after adjusting for the number of variables in the model, the explanatory power is 4.7%. This indicates that the independent variables in this study have a relatively low ability to explain the dependent variable.

Table 10Model Fit Test Results

ANNOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,383	3	,128	57,745	<,001[b]
	Residual	,097	44	,002		
	Total	,480	47			

a. Predictors: (Constant), EP, EMS, IO,ME

Dependent Variable : Carbon Emission Disclosure

Sumber: Hasil Output SPSS 31 (2026)

The F test is used to determine whether the independent variables jointly influence the dependent variable. Based on the ANOVA table, the calculated F value is 57.745 with a significance value of <0.001.

Because the significance value is less than 0.05 (0.001 < 0.05), it can be concluded that the environmental performance (EP), environmental management system (EMS), and institutional ownership (IO) variables simultaneously have a significant effect on carbon emission disclosure (CED).

Table 11T-Test Results

Coefficients[a]

Model		Unstandardized	Coefficients		
		B	Std. Error	t	Sig
1	(Constant)	,364	,078	4,638	<,001
	EP	,038	,018	2,037	0,048
	EMS	,130	,060	2,186	0,034
	IO	,132	,034	3,837	<,001

a. Dependent Variable : CED

Sumber: Hasil Output SPSS 31 (2026)

Based on Table 11, the EP variable has a regression coefficient of 0.038, a t-value of 0.037, and a significance of. = 0.,048. a Beca of 0.018. If the significance value is smaller than 0.05, the first hypothesis is accepted, meaning that EP has a positive and significant effect on CED. The EMS variable has a regression coefficient of 0.130, with a t-value of 2.186 and a significance. = 0.034. Because the significance value is smaller than 0.05, the second hypothesis is accepted, so that EMS has a positive and significant effect on CED. The IO variable has a regression coefficient of 0.132 with a t value = 3.837 and sig. <0.001.

Because the significance value is smaller than 0.05, the third hypothesis is accepted, meaning that IO has a positive and significant effect on CED.

Discussion

The Influence of Environmental Performance on Carbon Emission Disclosure

Based on the partial test results, the EP variable has a regression coefficient value of 0.038 with a t-value of 2.037 and a significance level of 0.048. Because the significance value is less than 0.05, the first hypothesis is accepted. This means that EP has a positive and significant effect on CED. These results indicate that an increase in EP will be followed by an increase in CED, although the effect is relatively small compared to other variables in the model.

This finding aligns with the theory that states that when a variable is able to improve the quality, effectiveness, or driving force of a particular process, the resulting output or performance will also increase. In the context of this research, EP is seen as a factor capable of strengthening CED because it can encourage improvements in the aspects targeted by the research. Thus, the results of this study support the theoretical argument that EP is one of the important determinants in forming CED. These results are also in line with research (Jannah & Narsa, 2020)and (Fortuna & Nazir, 2022)indicate that the EP variable has a positive relationship with dependent variables related to increased performance, effectiveness, or achievement of results. Several previous studies have found that when EP increases, the ability of organizations, individuals, or systems to achieve goals also increases. Therefore , the results of this study strengthen previous empirical findings that EP plays a role in driving CED.

The Influence of Environmental Management System on Carbon Emission Disclosure

The EMS variable shows a regression coefficient value of 0.130 with a t-value of 2.186 and a significance level of 0.034. Since the significance value is less than 0.05, the second hypothesis is also accepted. Thus, EMS has a positive and significant effect on CED. This means that the better the EMS, the higher the resulting CED.

Theoretically, these results can be explained by the view that a system or mechanism capable of supporting efficiency, coordination, and process management will have an impact on increasing final results. EMS in this study appears to be a factor that contributes quite strongly to CED, because its coefficient is greater than that of EP. This means that the role of EMS in driving CED is more prominent than EP, although both are equally significant. Conceptually, this indicates that EMS aspects not only function as support, but also as elements that directly influence the final results. This study is also consistent with research (Yanto et al., 2025) and (Desvita & Rahma, 2025) which states that EMS has a positive influence on various outcome or performance indicators. Previous studies generally show that strengthening EMS can increase implementation effectiveness, improve process quality, and ultimately drive better outcomes. Thus, the findings of this study strengthen the empirical evidence that EMS is an important variable in explaining CED.

The Influence of Institutional Ownership on Carbon Emission Disclosure

The analysis results show that the IO variable has a regression coefficient of 0.132 with a t-value of 3.837 and a significance level of <0.001. Because the significance level is much smaller than 0.05, the third hypothesis is accepted. This means that IO has a positive and significant effect on CED. From these results, it can be concluded that IO is the variable with the strongest influence among the three independent variables in this model.

Theoretically, these results can be explained that well-managed inputs or internal factors will produce more optimal output. In this study, IO appears to have a strategic position because its coefficient is the highest, so its contribution to CED is also the largest. This indicates that increasing IO will significantly determine the increase in CED. In other words, success in managing IO will be the main driver of achieving the expected results. These findings also support research (Bedi & Singh, 2025)and (Angelina & Handoko, 2023)generally state that IO has a positive influence on the final results, both in the form of performance, effectiveness, and development achievements. Previous studies have shown that good IO can strengthen internal processes and produce higher output. Therefore, the results of this study confirm that IO has a significant empirical contribution to CED.

V. Conclusion

This study aims to analyze the influence of environmental performance, environmental management systems, and institutional ownership on carbon emission disclosure. The results show that all three variables influence carbon emission disclosure, thus concluding that environmental factors and ownership structure play a role in determining the level of corporate transparency. Theoretically, these results support legitimacy and stakeholder theory, which suggests that companies adjust disclosures to meet stakeholder expectations. In practice, these research findings can help companies and investors understand the importance of carbon emissions disclosure. This study has limitations in the sample size and the variables used. Therefore, further research is recommended to add more variables and expand the research object to achieve more comprehensive results.

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